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ABSTRACT

This study investigated the relationship between visual attending and learning in a group of 16 Head Start children from low income families. Attending behavior (defined as "eyes oriented towards the teacher and/or teaching materials for a full 5-second interval") was measured for each child during a 10-minute story period on four consecutive days. During each story period, cassette recordings of two stories were played while the teacher showed corresponding pictures. Between the two stories, the teacher performed a number of distinct motor behaivors (i.e., arms raised over head). These motor behaviors were used to test children's recall of model behavior. After each day's storytime, children were individually questioned about the material presented during the second story and were asked to perform the same motor behaviors that the teacher had done between the two stories. Children were asked questions to which answers could be obtained: (1) only by looking at the pictures or (2) only by listening to the story text. Half of the subjects (the experimental group) received praise for orienting their eyes towards the teaching materials and not talking to other children. Results showed that the mean level of attending on treatment days for the experimental group was 70.25% compared with 46.2% attending for the control group, a statistically significant difference. It appears that reinforcing visual attention does facilitate learning in the classroom for most children. (BRT)

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Social Reinforcement of Attending: Effects on Classroom Learning in Disadvantaged Preschoolers

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The inattentive, disruptive child constitutes one of the main sources of referral for psychological services in the preschool and elementary grades. Teachers are entrusted with the responsibility of working with large numbers of children and the inattentive, disruptive child makes this challenging task even more difficult. Included in almost all referrals for the inattentive child is one of the following comments made by the teacher, "She doesn't pay attention in class."; or perhaps "He doesn't seem interested in learning." In essence the teacher is saying, inattention is interfering with learning.

Recognizing the concern of educators, attending behavior in the classroom has been the focus of considerable research in recent years. The majority of these studies have been aimed at developing procedures whereby the teacher can effectively maintain high rates of visual attending in the classroom. A variety of effective procedures have been demonstrated, including those of social reinforcement, tangible reinforcement, token reinforcement procedures, and vicarious reinforcement.

The assumption underlying this work is that inattentiveness, and the disruptive behavior which frequently accompanies it, interfere with learning. Further, it is assumed, that once high levels of attending are achieved, improved learning of academic materials will follow. Obvious as these assumptions may appear, there is little evidence from either laboratory or applied research that the presence of high rates of visual attending is a sufficient condition for learning to occur.

There is some evidence from correlational studies suggesting a relationship between visual attending and academic achievement. However, no study has directly demonstrated that increasing attending facilitates learning in the classroom. In the one study designed to test this hypothesis, Ferritor, Buckholdt, Hamblin & Smith measured third grader's rate of attending and performance on arithmetic problems. Attending behavior was

directly reinforced and the effects of this procedure on academic performance were examined. These investigators reported that increased levels of attending did not result in improved performance. It should be noted that this study focused on a task, arithmetic, which required previously learned skills, skills which the subjects may not have acquired. It is possible that increased attending does result in increased learning if implemented early enough. That is, before the child is exposed to several years of school failure, and failure to learn the basic skills.

The purpose of the present study was to investigate the relationship between visual attending and learning in a disadvantaged preschool population. First, we wanted to develop an effective procedure for maintaining visual attending at high rates. The focus of the project was then, on the effects of attending in a structured group situation, with an examination of the amount and kind of material learned. Specifically this study explored the effects of experimentally maintaining classroom attending at high levels on 1) learning of visual and auditory educational material, and 2) observational learning, the recall of social and behavioral cues presented by the teacher.

Subjects in this study were 16 white children, from low income families, with a mean age 5.1 years, comprising one class in a Head Start Development Center. This appeared to us to be a very appropriate group with which to work, since it is a population which has a high probability of experiencing later academic difficulty. By choosing preschoolers we were also able to directly investigate the important question of how attending is related to learning prior to school entry and a history of school failure.

For the first four (4) days of the study we gathered baseline attending data on the children. This involved the daily presentation of two short stories to the entire group of children as they sat in a circle. Cassette

recordings of the stories were played while the regular classroom teacher showed corresponding pictures. The content of the stories focused on a variety of preacademic and social skills. Storytime lasted approximately ten minutes. Between the two stories the teacher performed a number of distinct motoric behaviors (i.e. arms raised over head). These were used to test recall of modeled behavior. During the entire session trained undergraduate assistants recorded the attending behavior of individual children via an observational code developed for this study. Attending behavior was defined as "eyes oriented towards the teacher and/or teaching material for a full 5-second interval."

After each day's storytime, children were individually questioned about the material presented during the second story and they were asked to perform the same motoric behaviors the teacher did between stories. The questions the children were asked were divided into two mutually exclusive categories - those which contained information that could have only been obtained by looking at the pictures (visual questions) and those that contained information only obtainable through listening to the cassette recording (auditory questions).

A randomized blocks design with 2 groups of subjects, matched on baseline attending scores was used. Subjects were assigned to groups according to this method to insure that initial ranges of attending behavior were equivalent in the experimental and control groups. Following the baseline period, the children served as subjects in their respective groups on every other day (treatment days) and were observed together as one class on alternate baseline days. The alternate baseline days were employed to further demonstrate stimulus control over attending. They will hereafter be referred to as extinction days.

On treatment days the general procedure for experimental and control groups were the same as those followed during baseline except that two

undergraduate females served as teachers. The teacher for the experimental group delivered contingent social reinforcement once to each child during each story. She made comments which included cues plus social reinforcement for appropriate behavior, such as, "Lisa is a good girl for looking up here." The contingency for receiving praise was eyes oriented towards the teaching materials and no talking to other children. The procedure for the control group was identical to that used for the experimental group with the exception of the teacher's comments. The frequency of personal comments and references toward paying attention, were equivalent. However, for the control group they were presented randomly and were not contingent upon specific behavior. An example of such a comment would be, "Ben, look up here." Thus the comments given to the two groups differed only in the respect that for the experimental group they were made contingent upon student attending and included a praise component.

Our first general finding was that contingent teacher social reinforcement is an effective procedure for maintaining high rates of preschoolers attending behavior. The mean level of attending on treatment days was 70.25% for the experimental group, which contrasts strikingly with the mean level of 46.20% attending for the control group. A three way ANOVA (group x treatment condition x sex) was performed to evaluate the significance of these results. The group by treatment interaction was highly significant, $p < .01$, indicating that the shift from baseline to treatment days differed significantly for the two groups. The control group rate of attending decreased from baseline to treatment days, while the experimental group increased its rate. Over the course of the study the two groups which were originally matched on rate of attending diverged in the predicted direction.

No significant differences were found between experimental and control groups rate of attending on extinction days. Although some tendency towards generalization of social reinforcement effects is seen in higher rates of

attending in the experimental group on extinction days 1 and 2, the means for the two groups are essentially equal on extinction days 3 and 4. This suggests that a discrimination between treatment and extinction conditions may have been gradually sharpened in the experimental group over the course of the study.

I'd like to focus now on the learning measures. The control group average percentage of overall questions answered correctly dropped considerably from baseline to treatment days as did their attending. The experimental groups average percentage of questions answered correctly remained stable from baseline to treatment days. The ANOVA performed on this data yielded a significant two way interaction, treatment condition x group. It thus appears that the increased level of attending on the part of the experimental subjects resulted in the maintenance of high levels of learning.

To more closely examine the relationship between attending and the retention of visual and auditory information a correlational analysis was performed. A separate analysis for experimental and control groups was conducted. The correlations were computed across days. The correlations between attending and visual, auditory, and overall questions answered correctly were significant at the $p < .005$ level for both groups.

Analysis of the retention of social cues (i.e. modeled behaviors performed between stories) revealed some interesting findings. Children in both groups decreased the number of behaviors modeled across the days of the study, with the exception of the girls in the experimental group (i.e. those girls receiving praise from the model). An ANOVA performed on this data yielded a three way interaction, group by sex by treatment condition, which was significant at the $p < .05$ level. While this finding appears to be striking in light of the fact that many behaviors are acquired thru imitation, it is possible that these effects can be attributed to the fact that only female models were employed. We are presently investigating

this question in our laboratory, using models of both sexes.

To summarize the results we found that reinforcing visual attention does facilitate learning in the classroom for most children. In this study, with a relatively small number of subjects, it appears particularly worthwhile to discuss individual patterns. Despite the significant overall group results, when we looked at the correlations between the amount of visual attention and visual material learned, for two subjects in the experimental group, and two subjects in the control group, increased levels of visual attending did not result in increased learning of visual stimuli. Curiously, and quite surprising to us was the finding that these same children did learn more auditory material the more they visually attended.

This suggests two possibilities: first, that these children may lack the concepts or cognitive skills necessary to integrate visual and auditory material, or second, that they may focus on irrelevant aspects of the teaching situation, such as facial or other social cues provided by the teacher. Both of these possibilities warrant further study. However, it appears certain that while attending behavior may be a necessary requisite for learning in the classroom, it surely is not a sufficient one.

The theoretical implications of this study include the need to further analyze the learning process. Specifically, what are these children who are visually attending but not processing the relevent visual material looking at? Are certain children not capable of analyzing and intergrating material presented?

From the applied point of view we want to emphasize the importance of developing individual assessment techniques. These assessment procedures ideally would provide information as to the child's strengths, weaknessess, and interests. With this information in hand, we would be able to present material appropriate to the child's level and in line with his or her interests. Then, perhaps, inattentiveness would no longer be a problem.

In essence we are advocating that the psychologist do more than simply maintain the status quo. Rather than simply decreasing inattentiveness and disruptive behavior in the classroom (a primary teacher concern), the psychologist's energies should be directed towards creating situations which facilitate learning (also a primary teacher concern).

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